

NOTES ON *TRICHOPSIDEA OESTRACEA* (NEMESTRINIDAE) AND
CYRTOMORPHA FLAVISCUTELLARIS (BOMBYLIIDAE)—TWO
 DIPTEROUS ENEMIES OF GRASSHOPPERS.

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(Plate vi; 19 Text-figures.)

[Read 25th May, 1938.]

Of the various species of flies which have been bred from material collected during the Council's grasshopper investigations, two have been found to attack the living hoppers at some stage of development. The first, *Trichopsidea oestracea*, is known as a grasshopper parasite (Noble, 1936), and the second, *Cyrtomorpha flaviscutellaris*, is recorded for the first time. These two larvae are the first to be described of the Australian Nemestrinidae and Bombyliidae.

TRICHOPSIDEA OESTRACEA Westwood.

Trichopsidea oestracea was described by Westwood in 1839, and Mackerras (1925) gave a detailed description, to which my specimens conform. The species is widely distributed throughout Australia, and is recorded also from New Guinea. Mackerras notes that the flies are active and difficult to capture, and that nothing is known of their feeding habits or life history.

A. S. Olliff (1891) records finding a large dipterous larva in locusts, but he did not breed the fly. He gives a small drawing of what is undoubtedly the larva of *Trichopsidea oestracea*, but it is printed upside down. Noble (1936) found the larvae in plague grasshoppers (*Chortoicetes terminifera*) from Hay, N.S.W., and in a species of *Parelytrana* from Gulargambone, N.S.W. He reproduces Olliff's drawing of the larva, and also figures it upside down. He does not describe the larva, and notes that the species has not previously been recorded as a grasshopper parasite, and that nothing is known of the early stages of Australian Nemestrinidae.

Little is known of the early stages of Nemestrinidae in any part of the world. The life history and immature stages of the European species *Hirmoneura obscura* Meig. which is parasitic on the beetle *Rhizotrogus solstitialis* has been described by Handlirsch (1883), and the eggs and first stage larva of the Chilean *Hirmoneura articulata* Ph. by Stuardo.

Notes on Larval Habits.

During October, 1935, one full-grown *Trichopsidea* larva was obtained from the eastern plague grasshopper, *Chortoicetes terminifera*, collected at Yass, N.S.W. In the same season (1935-36) Mr. A. L. Tonnoir released a number of this species of hopper, taken locally, in a field cage. At the end of January several *Trichopsidea* larvae were found in the cage. These remained in the larval stage for six months, when they were transferred to a room kept at 23°C. in order to hasten their metamorphosis. Some of these larvae pupated early in August and emerged at the end of the month, the pupal stage under these conditions occupying 20 days.

The others did not pupate until December and emerged in January. Thus, even at a high and uniform temperature, they remained larval for eleven months.

With the exception of one which was dug from a grasshopper egg-bed at Jugiong, N.S.W., all larvae used in this study were obtained from adult hoppers taken in the field and from which they emerged when these were placed in cages. They were all full-fed and sluggish, being practically incapable of progression at this stage. One early stage Nemestrinid larva was dissected from the abdomen of a grasshopper, *Parelytrana* sp., by Mr. Tonnoir. It is not certain that this is the early stage of *Trichopsidea*, but its structure suggests that it is. Further evidence is lent by the fact that the host was collected in the Gulargambone district, where Noble obtained a *Trichopsidea* larva from the same species. This particular species of host, *Parelytrana* sp., is not wide-spread, being confined to the western plains.

In December, 1936, several species of common grasshoppers occurring in Canberra were collected and placed in field cages by Mr. Tonnoir, one species to each cage. During June and July, 1937, the soil in these cages was sieved for eggs, and in several cages the large larvae of *Trichopsidea* were found. The numbers were as follows: *Phaulacridium vittatum* 7, *Gastrimargus musicus* 6, *Austroicetes pusilla* 4, *Macrotoma securiformis* 1. *Trichopsidea oestracea* evidently parasitizes many species of grasshoppers besides the plague species *Chortoicetes terminifera*. The percentage parasitism doubtless varies with the host-species and with various localities, but in Canberra, for all species attacked, is estimated roughly at about 5%. The larvae are thus fairly abundant, in striking contrast to the scarcity of the adult, which is seldom seen in the field and is comparatively rare in collections.

The Young Larva.

The larva (Plate vi, fig. 1) was dissected from the abdomen of a species of *Parelytrana* by Mr. Tonnoir, who noted that it was slender, worm-like and very active. In striking contrast to the full-grown larva, it is elongate and smooth, resembling in general form the newly hatched *Hirmonoura* larva (Handlirsch, 1883; Stuardo, 1935) which, however, is only 2 mm. in length and has a pair of elongate hooked "locomotor organs" on each segment. Taking into consideration its size and the lack of locomotor organs, the larva described below was probably in its second instar.

The length was nearly 6 mm. and the greatest width less than 1 mm. It is white, slender, cylindrical, slightly wider in the middle and narrowed at each end, the tapering being most pronounced at the posterior end. The segments are elongated, particularly the last three, which seem remarkably flexible or mobile. The posterior extremity is cut off abruptly, the spiracles being situated on a flat vertical face with a small circumference. The surface of the body is entirely devoid of hairs or protuberances and has a perfectly smooth appearance although the skin actually has a fine transverse wrinkling.

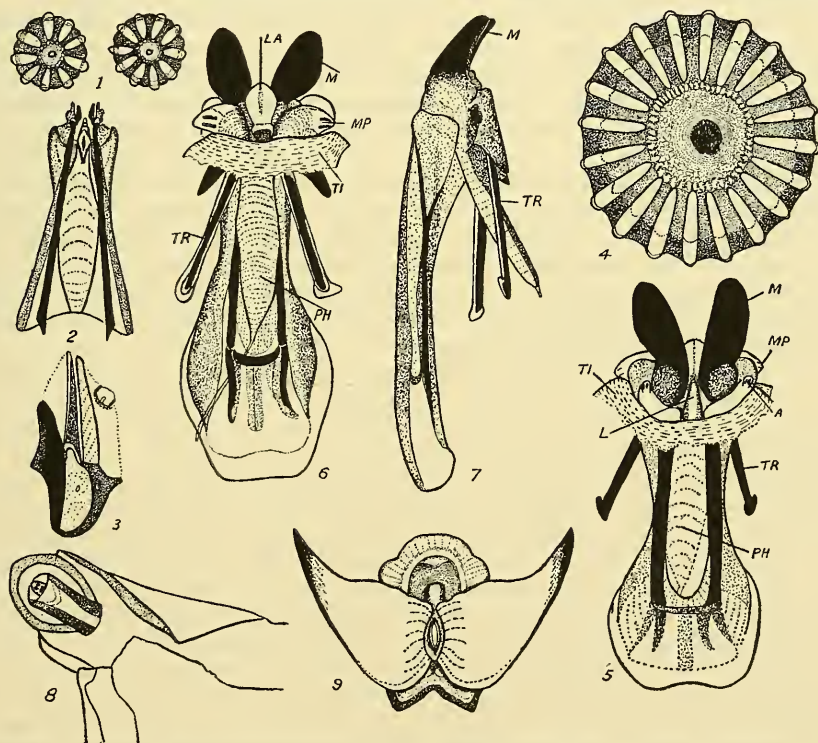
There are three thoracic and eight abdominal segments visible. The head is extremely small. The segmentation is not well defined, owing to the absence of bands of spines or papillae, and the constriction is very slight. The only spiracles visible are those at the posterior end (Text-fig. 1). They are a pair of small, lightly chitinized circular plates, set fairly close together. Each has nine or ten elongate-oval slits radiating from the centre like the spokes of a wheel. They are not protected by hairs or projections and lie flush with the flat surface.

The mouth-parts are small and lightly chitinized, being yellowish or light brown. The bulk of the head and mouth armature is enclosed within the thoracic

segments, only the mandibles and maxillae being permanently protruded (Text-fig. 2). The head and mouth-parts appear to be similar in structure to those of the first-stage larva of *Hirmonectura*. The epicranium is represented by a dorsal elongate plate of fairly light chitin, with the lateral edges strengthened and turned down over the pharynx. Anteriorly these converge as chitinous bars to the base of the labrum, whilst the lateralia arise from the epicranium lateral to them, curving forwards and inwards and forming a cup-like depression in which the mandibles and maxillae are set. The epicranium ends anteriorly in the small nose-like labrum. The pharynx is a wide shallow trough, with the labium attached to its anterior end. The tentorial rods are attached to the epicranium at its anterior end on each side of the pharynx, and the rounded curved ends are associated with the base of the mandibles. The mandible and maxilla are closely united, the mandible being small, and the maxilla elongate and pointed (Text-fig. 3). These are the most anterior of the mouth-parts, projecting well in front of the labrum and labium.

The Full-grown Larva.

The following description is from prepupal larvae (Plate vi, figs. 2 and 3) which had left the hoppers and buried themselves in the soil. They measured



Text-figs. 1-9.—*Trichopsidea oestracea*.—1, Posterior spiracles of young larva, $\times 170$. 2, Head of young larva, $\times 75$. 3, Maxilla and mandible of young larva, $\times 225$. 4, Posterior spiracle of full-grown larva, $\times 135$. 5, Head of larva, dorsal view, $\times 30$. 6, Head, ventral view, $\times 30$. 7, Head, lateral view, $\times 32$; *a*, antenna; *l*, labrum; *la*, labium; *m*, mandible; *mp*, maxillary palp; *ph*, pharynx; *ti*, thoracic integument; *tr*, tentorial rod. 8, Antenna, $\times 160$. 9, Posterior end of pupa, $\times 37$.

from 9 to 17 mm. in length, and the greatest width of the largest ones was 5 to 5½ mm. The larva is broadest in the middle and narrows at each end, but most anteriorly. It is convex, with the stronger curve ventral, and a slight ridge along each side. The posterior end is truncated, the last segments curving upwards. The larva is robust, tough and leathery, yellowish-fawn to ochre in colour. Superficially it resembles the larva of *Hirmonoura* figured by Handlirsch and by Brauer.

The Head and Mouth-Parts (Text-figs. 5, 6, 7).—The whole of the head structure is enclosed within the thorax. The epicranium is an elongate plate of transparent chitin widened posteriorly, and strengthened by a pair of longitudinal chitinous bars, converging anteriorly to the labrum and united towards the posterior end by a short transverse bar. The lateral edges curve downwards and slightly under. Anteriorly the edges expand and curve laterally to form the lateralia. A pair of comparatively short tentorial rods run from the base of the labium on each side of the pharynx ventrally. The pharynx is a strong elongate trough-like organ about three-fourths the length of the head. The labium is connected to the anterior end of the pharynx and has a salivary duct opening into it. It is a small delicate organ lying between the mandibles ventrally, devoid of hairs, and visible externally on the larva. The labrum is a short nose-shaped projection at the end of the epicranial plate between the base of the mandibles and above the labium.

The antennae (Text-fig. 8) are very small and difficult to detect, being hidden by the edge of the thoracic integument. They are situated on the edge of the lateralia, and are flattened against the surface close to the outer edge of the base of the mandibles. There are three segments, two lying parallel to the surface and directed laterally, pressed close against the surface, and a small dome-shaped apical segment.

The mandibles are large, black, and shovel-shaped, the dorsal side being convex. These project permanently on the larva, but the bases extend some way inside the thorax, well behind the labrum and labium. The maxilla is closely associated with the mandibles. It is perfectly smooth and somewhat reduced, being very short and rounded, appearing as a small dorso-lateral bulge beside the mandible. The palp, however, is very large, and is conspicuous on the ventral aspect of the larva projecting laterally below the mandibles.

The segments are well marked, there being three thoracic and nine abdominal, each but the last being divided by longitudinal furrows into dorsal, lateral and ventral areas. Dorsally each thoracic segment has a thick fold at the anterior border. On this are borne 10 to 12 short, rounded protuberances running transversely right across the dorsum. On the first segment they coalesce into one narrow ridge. Also on the first segment are two series of four protuberances posterior to the fold. The lateral regions bear five protuberances in the first segment and four in the others, the one nearest the ventral edge being the largest. On the ventral areas each segment has six papillae, a pair on each side of the mid-line and one further out. There is an anterior extension of the first segment enveloping the base of the mouth parts and forming a small pseudocephalon.

Dorsally each abdominal segment has a pair of crescentic ridges with the convexity facing posteriorly, one on each side of the mid-line. These are less conspicuous on the last three segments. In the middle of each segment running transversely right across is a series of twelve flattened projections, forming a low broken ridge, and joining on the 6th and 7th segments to form a continuous ridge. Laterally there are four papillae, three in a transverse line and a larger one anterior to these and nearer the ventral edge. These large lateral papillae form a longitudinal line down the larva ventro-laterally. Ventrally in a transverse

series across the middle are eight papillae, four smaller grouped at the mid-line, and the rest larger and more lateral. Anterior to this series and near the anterior border is a pair of large papillae, more elongate than any others, projecting slightly backwards.

The dorsal face of the eighth segment (Plate vi, fig. 5) is occupied chiefly by an area which is almost circular in outline, and slightly raised. There is a slight depression towards the posterior edge and the spiracles are situated anterior to this, lying flush with the surface. Posteriorly there is a row of six large, prominent, blunt projections, forming the terminal extremity of the larva. The two outermost prominences are the terminations of the lateral ridges of the eighth segment. The ventral area of the eighth segment is reduced to a narrow sternite bearing two pairs of very flattened and inconspicuous papillae. The papillae on the dorsum are also inconspicuous, there being three on each side of the spiracles and four posteriorly in front of the large terminal projections.

The ninth segment is entirely postero-ventral, having a steeply inclined surface running from the sternite of the eighth segment to the base of the terminal projections. It is devoid of papillae, but the anus, a longitudinal slit situated on it, has two rounded swellings each side.

The posterior spiracles are conspicuous circular, chitinous plates placed fairly close together (Text-fig. 4). They are the only spiracles present, the larva being, like that of *Hirmonectura obscura*, metapneustic. The slits are the length of half the radius, and radiate like medullary rays all round the circle from half-way to the centre. There are twenty slits to each spiracle, and they are narrow and elongate. There is a smaller, inner circle, half the radius of the plate. This is formed of pale, spongy, dull chitin, whilst the outer ring is of smooth brown shining chitin. The inner circle is depressed towards the centre which is occupied by the "button", a black chitinous mass. The felt chamber is short and has a thick central core, the inward extension of the inner circle of the spiracle. Laterally on every segment from the first thoracic to the seventh abdominal there is a very minute vestigial spiracle. It occurs just above the large rounded protuberance near the ventral anterior edge of the lateral area, and is not visible on the larva. By clearing and staining it may be detected as a small unchitinized spot with a very slender thread-like tracheole connecting it with the main tracheae.

The Pupa.

The pupa (Plate vi, fig. 4) is very similar to that of *Hirmonectura obscura*. It measures 15 to 16 mm. in length, the female being rather broader than the male pupa. It is tawny yellow to ochre in colour. The ventral surface of the abdomen is strongly convex, as in the larva, and the end segments turned up in the same manner. The following description is from a male pupa.

The thorax is short, the head and thorax being only 5 mm. long. The leg- and wing-sheaths do not extend beyond the first abdominal segment. There are no bristles on the head and thorax which are of wrinkled chitin. The antennae are small, flattened, well separated and pointing downwards and slightly outwards. The thoracic spiracles are just behind the head, and have the appearance of a shining bead of dark brown chitin. The slit is near the base of the bead and runs transversely on its posterior aspect. The ends are curved strongly. At the base of the wing-sheaths is a small elevation. The suture runs longitudinally down the dorsum of the head and thorax, and transversely across the head.

The abdominal segments are marked into dorsal, lateral and ventral areas by furrows. The lateral areas form a ridge down each side. The middle of each

segment except the last is encircled by a girdle of spines. These are stiff and brown, increase in length towards the side, and are longer ventrally than dorsally. A few are bifid. On the lateral areas there are three in the row which are greatly lengthened and have hooked ends, the hooks curving forwards. Each lateral area on segments one to seven has a spiracle towards the ventral edge. These are also like shining beads and are in line with the thoracic spiracles. The slit is, however, situated on the anterior aspect, in the form of a transverse curving line. The eighth segment has at its terminal end, in the position of the "aster" of Tabanid larvae, a shining dark-brown chitinous structure like an outspread pair of wings raised on a disc, which has a pair of projections postero-ventrally below the "wings" (Text-fig. 9). A similar structure occurs in *Hirmoncra*. Below this structure and a little anterior to it is a pair of strong short spines with a smaller one beside them. These form part of a broken girdle of very minute spines round the segment.

The female pupa differs chiefly in having a smaller head, a wider abdomen, and the terminal "wings" are not outspread, but half raised.

CYRTOMORPHA FLAVISCUTELLARIS Roberts.

Cyrtomorpha flaviscutellaris was described by Roberts (1919) from the Swan River, Western Australia, and has only been recorded from the southern part of that State. Nothing was known of its breeding habits until Dr. K. Key found it associated with grasshopper egg-beds. Many genera and species of Bombyliidae are known to feed on grasshopper eggs in the larval stage in other parts of the world. A list of these is given by Uvarov (1928). Although the breeding habits of many species are known, there is very little literature on the structure of the early stages. Riley (1880) described the larva and pupa of *Systoechus oreas* and *Triodites mus*, two species which feed on hopper eggs in North America. Nothing has been published on the larvae of Australian Bombyliidae.

Notes on Larval Habits.

In May, 1936, Dr. Key collected several larvae of *Cyrtomorpha* in the egg-beds of *Austroicetes cruciata*, the plague grasshopper in the south of Western Australia, at Nungarrin, W.A. The egg-bed was dense and the egg-pods were at all stages of development. The *Cyrtomorpha* larvae were found in rather loamy soil close to and between empty pods, the contents of which they had doubtless destroyed. Later in the season further consignments of egg-pods collected by Mr. C. Jenkins and Mr. L. J. Newman at Bencubbin, Kunnunoppin and Kellerberrin were received, containing more specimens of *Cyrtomorpha* larvae.

On 26th June, 1936, two larvae received from Dr. Key were placed in the constant temperature room (22°C.). One pupated after nearly four months at this temperature, being kept in the dry soil in which it was found. On 12th November the fly emerged, after 24 days in the pupal stage. The other larva did not pupate and was removed from the hot room in January to the laboratory, where it remains still in the larval stage after 14 months. On 26th August four larvae were obtained from the original material and placed in the hot room. They had all pupated by 15th December, and all emerged in the week ending 5th January, 1937.

Nothing is known of the early stages of the larvae, or the length of their feeding stage.

The Full-grown Larva.

The larva (Plate vi, fig. 6) measures from $5\frac{1}{2}$ to 9 mm. in length when extended. The normal position is curled round with the head and posterior ends touching, the larva straightening out only when disturbed, and then quickly springing back

into the curved position. It is thick-set and broad, widest at the anterior end, tapering slightly to the posterior. The larva is sluggish and seems incapable of moving about. When forcibly straightened so that the ventral surface is visible, the segments appear to be narrower ventrally and the skin more delicate. The colour is deep cream, with the skin very thin and transparent, so that the internal organs are visible, the colour being due to these. The skin has a fine transverse wrinkling.

Just beneath the skin each segment is invested with a thick layer of opaque spongy white fat-body which, however, resists all the common fat solvents tried. Owing to the skin being tightly stretched on the dorsal surface by the curved attitude of the larva, the ring of fat-body in each segment is distinct as a clear yellowish substance visible between each segment. Riley describes a similar appearance in *Systoechus*. Ventrally the whole surface appears opaque-white, owing to the contraction of the segments. Great quantities of oil are released from the white layer when the thin integument is damaged. In the thoracic segments the fat-body is not so close to the surface.

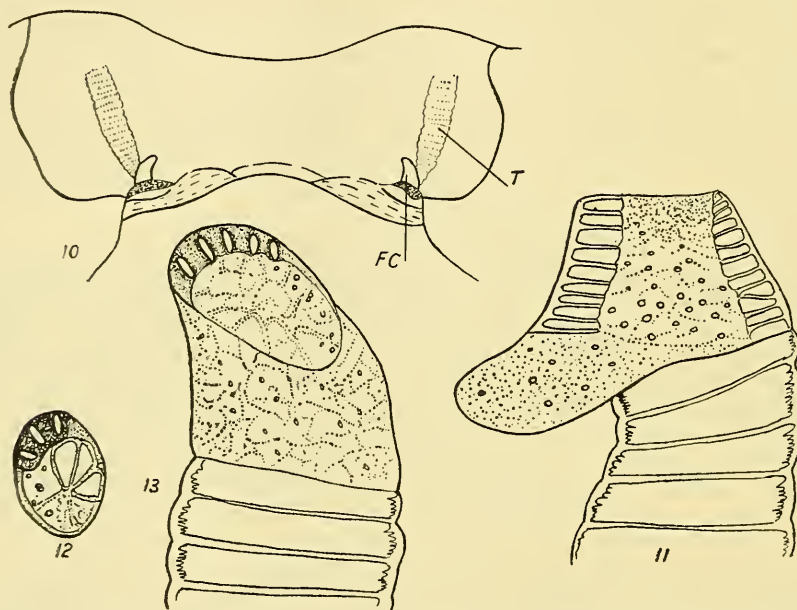
The head is small and enclosed within the first thoracic segment, only the tips of the mouth-parts protruding (Text-fig. 14). The epicranium is elongate and narrow, widening a little at the posterior end. It is strengthened by a pair of longitudinal narrow chitinous bars which expand at the posterior end. Ventrally there is a pair of tentorial rods slightly shorter than the epicranium, converging anteriorly at the base of the maxillae. The epicranium ends anteriorly in a bi-lobed structure, each lobe of which is bulbous and opaque greyish-white in the living larva. It is a noticeable feature of the head and cannot apparently be retracted. It appears to be characteristic of Bombyliid larvae. Malloch figures it in *Sparnopolius fulvus*, and Séguy in *Bombylius fugax* where it is bifid, as in *Cyrtomorpha*. The chitinous struts of the epicranium run up into the two lobes. The structure probably represents the labrum, as the undersurface has the characters of the epipharynx. Riley mentions it in *Systoechus* and *Triodites*, and considers that it may represent the labrum. Ventrally there is a thin, narrow chitinous plate, the labium, bearing a pair of bristles, probably the labial palps. This just projects beyond the margin of the first segment on the ventral surface.

At the sides of the head, just lateral to the base of the large dorsal lobes, are the antennae (Text-fig. 15). These consist of a small clear membranous area bearing a slender, elongate cylindrical segment with minute sensillae at the tip, and close to it at the base a tiny brown dome-shaped projection.

The maxillae are well-developed, large and chitinous, being probably the most functional and active of the mouth-parts (Text-fig. 16). They are broadly triangular in shape, curved dorsally, and with a blunt tip. They project well forward, being considerably anterior to the bilobed labrum. Dorso-laterally each bears a large, conspicuous palp. This arises from a clear patch in the strong chitin of the maxilla and consists of an elongate segment bearing a group of small sensillae at the top. The base of the palp is surrounded by a group of five bristles, one being longer than the rest. The mandibles are small and closely associated with the maxillae (Text-fig. 17). Each is slender and styliform, with four small serrations at the tip. They arise from a strong chitinous mass which is curved back ventrally and lies between the maxillae at the ends of the tentorial rods.

The segmentation of the body is well marked, owing to the clear band between the fat-body in each segment. There are three thoracic and nine abdominal segments. The lateral ridge is poorly developed but can be distinguished clearly in the last few segments. In the eighth it is a well-marked lateral projection.

This segment has also four short blunt projections on the posterior margin ventrally. The ninth segment is short and slopes off to a rounded tip. It bears a series of six little blunt papillae dorsally, and on the ventral surface the anus appears as a small longitudinal slit. There is a pair of exceedingly fine and delicate hairs ventrally on each thoracic segment, situated one on each side of the mid-line near the lateral edge. The rest of the body appears to be entirely devoid of hairs.

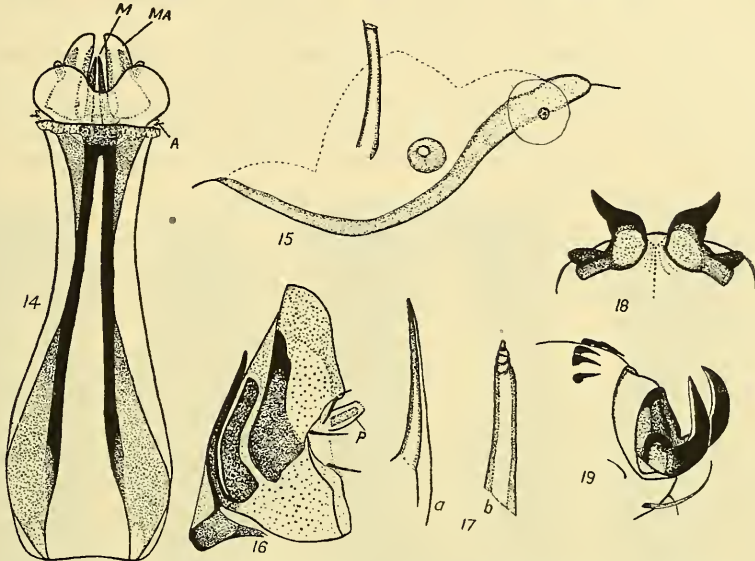


Text-figures 10-13.—*Cyrtomorpha flaviscutellaris*.—10, Dorsum of eighth abdominal segment (cleared), $\times 50$; fc, felt chamber; t, trachea. 11, Felt chamber of posterior spiracle, $\times 450$. 12, Posterior spiracle, $\times 450$. 13, Anterior spiracle, $\times 570$.

The spiracles are exceedingly minute, and of colourless delicate chitin like the rest of the integument. The posterior pair is situated on the penultimate segment near its posterior border and at the junction with the lateral swelling (Text-fig. 10). The spiracular area is visible as a small skin fold, to which a tracheal trunk is readily traced. The spiracle itself is completely concealed, as it lies on a narrow fold facing posteriorly, so that the plate is vertical to the dorsal surface of the body, and is moreover further enveloped by folds of skin. The felt chamber is comparatively large and roughly triangular in shape (Text-fig. 11). The spiracular plate is oval in shape, with three small slits at one end (Text-fig. 12). Malloch notes that the spiracles of Bombyliid larvae are small and difficult to detect, but Riley and Séguy figure them conspicuously on *Systoechus* and *Bombylius*.

The anterior spiracles, situated laterally on the first thoracic segment, are concealed in a similar manner to the posterior spiracles. The plate is slightly larger and easier to detect owing to the greater number of slits (Text-fig. 13). It is interesting to note that in *Systoechus* and *Bombylius* the anterior spiracles are also larger than the posterior, and have a similar structure to those of *Cyrtomorpha*.

Both Malloch and Riley state that lateral abdominal spiracles are absent. In *Cyrtomorpha* there is a very minute spiracle on each side of abdominal segments one to seven. It appears as a tiny pore surrounded by a ring of strong chitin. The felt chamber is visible beneath the skin with a branch leading to the tracheae.



Text-figs. 14-19.—*Cyrtomorpha flaviscutellaris*.—14, Head of larva, $\times 65$; a, antenna; m, mandible; ma, maxilla. 15, Antenna, $\times 335$. 16, Mandible and maxilla, $\times 170$; a, lateral view; b, ventral view. 17, Palp. 18, Head armature of pupa, $\times 20$. 19, Posterior end of pupa, $\times 20$.

The Pupa.

The pupae (Plate vi, fig. 7) vary a little in size, like the prepupal larvae, the largest measuring 8 to 9 mm. in length. The abdomen is strongly curved, as in the larval state, but the thorax is comparatively straight. The colour is at first greyish-white, changing through brown to almost black as development proceeds. The actual pupal skin is transparent and colourless, so that the colour is due to the developing nymph within. The tips of the leg and wing sheaths extend to the second abdominal segment, the thorax being short in comparison with the abdomen.

The pupal armature is as follows: On top of the head is a pair of strong pointed thorns projecting upwards, and connected with them is a pair of lower, lateral, smaller blunt projections (Text-fig. 18). The whole structure is dark brown and of very strong chitin. All other Bombyliid pupae described have six or eight spines on the head, including a pair at the base of the proboscis. *Cyrtomorpha*, however, lacks all but the two pairs, but there are, in addition, several small, fine hairs, which are situated one behind each of the large cephalic thorns, a pair on the head below the armature, and a series of six across the middle of the prothorax dorsally. Abdominal segments one to three bear six long brown spines dorsally in a transverse series, those on the first segment being the largest and having hooked ends. On segments four to seven the spines are replaced by short hooks, which are strongly curved, and become progressively larger from each segment to the next. On the lateral areas of segments one to

seven there is a pair of long straight spines. Ventrally the skin is more than usually delicate and membranous, and there is no armature, with the exception of a pair of small hairs on the posterior border of segment seven. The eighth segment is small, and bears at its extremity a pair of heavy chitinous plates from which arise a pair of very strong, black, upwardly-curved hooks (Text-fig. 19). These resemble the terminal armature in *Anastoechus*.

The thoracic spiracle is very small, situated laterally on the fore border of the prothorax, just behind the head. It appears as a small brown spot raised on a slight swelling of transparent skin. Three slits arranged fan-wise occupy the spiracular plate. The abdominal spiracles are still smaller and occur on the lateral area near the fore-border of segments one to seven. The opening is a single slit facing posteriorly.

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DESCRIPTION OF PLATE VI.

- Fig. 1.—The young larva of *Trichopsidea oestracea*, $\times 7$.
- Fig. 2.—Full-grown larva of *T. oestracea*, dorsal view, $\times 2.5$.
- Fig. 3.—Full-grown larva of *T. oestracea*, lateral view, $\times 2.5$.
- Fig. 4.—Pupa of *T. oestracea*, ventral view, $\times 3.1$.
- Fig. 5.—Posterior end of larva of *T. oestracea*, showing spiracles, $\times 5.6$.
- Fig. 6.—Full-grown larva of *Cyrtomorpha flaviscutellaris*, $\times 5$.
- Fig. 7.—Pupal skin of *C. flaviscutellaris*, $\times 5$.